

## CURRICULUM VITAE

JOHAN H. van de SANDE

**BIRTH DATE:** October 28, 1941

**BIRTHPLACE:** Bergen op Zoom, Netherlands

**NATIONALITY:** Canadian

**DEGREES:**

1963	B.Sc., University of Leiden Netherlands
1968	Ph.D., Dept. of Chemistry, University of Alberta Edmonton, Alberta

**AWARDS:**

1959-1963	Dutch Government Scholarship
1965-1968	National Research Council of Canada Studentship
1967-1968	The University of Alberta Dissertation Fellowship
1980-1981	Medical Research Council of Canada Visiting Professorship (Max Planck Institute, Goettingen, West Germany)
1981	Alberta Heritage Foundation for Medical Research Visiting Scientist

### PROFESSIONAL EXPERIENCE:

Post-doctoral Fellow	Institute for Enzyme Research, University of Wisconsin 1968-1970
Research Associate	Department of Biology, Massachusetts Institute of Technology 1970-1972
Assistant Professor	Division of Medical Biochemistry, The University of Calgary 1972-1975
Associate Professor	Division of Medical Biochemistry, The University of Calgary 1975-1979
Professor & Head	Department of Medical Biochemistry, The University of Calgary 1988-1993
Associate Dean (Research)	Faculty of Medicine, The University of Calgary 1993-1995
Professor	Department of Medical Biochemistry, The University of Calgary 1979-present
Director of Research	Alberta Cancer Board 1996 - 1998
Vice Dean	Faculty of Medicine, The University of Calgary 1998 - Present

**INTRAMURAL ADMINISTRATIVE POSITIONS:****FACULTY:**

Member	Executive Faculty Council (1973-1975, 1977-1979, 1993-1995)
Member	Curriculum Committee (1974-1977)
Chair	Space Allocation Committee (1973-1976)
Member	Research Committee (1979-1981, 1993-present)
Chair	Growth and Development Research Group (1973-1974, 1984-1985)
Member	Nominating Committee (1978-1979, 1981-1982, 1985-1986) - (1990-1992)
Chair	Nominating Committee (1984-1985)
Member	Medical Student Admissions Committee (1982-1984)
Chair	Medical Student Admissions Committee (1985-1987)
Coordinator	Research Seminars (1973-1975)
Member	Budget Committee (1984-1986, 1993-present)
Chair	Student Appeals Committee (1987-1988)
Member	Research and Development Committee (1988-1992)
Member	Recruitment Priorities Committee (1992-1995)
Chair	DNA Synthesis Facility Committee (1982-present)
Member	Executive Committee, Partners in Health Campaign (1993-1995)
Chair	Planning and Priorities Committee (1998-present)
Member	Department Heads Selection Committees (1998-present)
Member	Chairs Selection Committees (1998-present)
Member	New Facility Planning Committee (1999 - present)

**UNIVERSITY:**

Member	University Space Allocations (1974-1976)
Member	Graduate Scholarship Committee (1974-1976)
Chair	Distinguished Lectures Series (1974-1978)
Member	University Biochemistry Group Executive (1980-1981, 1988-1990)
Member	Committee on Admissions and Transferability (1985-1987)
Member	Dean of Medicine Review (1987)
Member	Dean of Medicine Selection Committee (1991)
Member	University Bio NMR Users Committee (1987-1992)
Chair	University Bio NMR Users Committee (1992-1993)
Member	Appointment, Promotion and Dismissal Committee (1992-1993)
Member	Board of Governors (1993-1995)
Member	General Faculties Council (1993-1995)
Board Representative	Senate, University of Calgary (1993-1995)
Member	Calgary Research & Development Authority - Technical Advisory Committee (1993-1996)

**EXTRAMURAL ADMINISTRATIVE POSITIONS:**

Member	Medical Research Council of Canada Fellowship Committee (1975-1979)
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Member	Medical Research Council of Canada Grants Panel (Molecular Biology) (1982-1983)
Chair	Medical Research Council of Canada Grants Panel (Molecular Biology) (1983-1988)
Member	Medical Research Council Biotechnology Training and Development Grants Panel (1983-1985)
Member	National Cancer Institute Grants Panel (1978-1982)
Member	Canadian Biochemical Society Nominating Committee (1974-1975)
Member	Provincial Cancer Hospitals Board Grants Committee (1980-1986)
Organizer	Northwest Nucleic Acids Conference (1973, 1976, 1980, 1988)
Member	Alberta Heritage Foundation for Medical Research - President Selection Advisory Committee (1990)
Member	Alberta Heritage Foundation for Medical Research Scholarship Renewal Committee (1988-1990)
Member	Human Frontier Science Molecular Biology Panel (1989-1991)
Vice-Chair	Program Advisory Committee - AHFMR (1991-1995)
Chair	Medical Research Council of Canada Program Grant Committee (1992-1994)
Member	Steacie Prize Awards Committee (1990-1991)
Member/Chair	MRC and University Site Visit Teams (1980-Present)
Regional Director	Medical Research Council (1994-1996)
Member	Council of Scientists - Human Frontier Science Program (1994-1997)
Member	Health Research Industry Task Force, Government of Alberta (1996)
Chair	Expert Review Panel - Protein Engineering Network of Centres of Excellence (PENCE) (1997)
Chair	Multidisciplinary Assessment Committee of the Canada Foundation for Innovation (1998-2000)
Member	Innovation and Science - Research Initiatives Program (2000)
Member	Gairdner Foundation (2000 – present)

#### EXTRAMURAL PROFESSIONAL ACTIVITIES:

Scientific Officer	Alberta Cancer Board (1986-1995, 1998-present)
Consultant	Du Pont PCR Litigation (1990-1992)
Consultant	BRL Lifetechnologies (1989-1991)
Consultant	Boehringer Mannheim (1985-1987)

#### TEACHING EXPERIENCE:

Biochemistry 549 (1974-1984) Independent Research Projects  
 Medicine 302 (1973-1980) Introductory Course (shared)  
 Medical Sciences 704 (1975-1980) Seminar Course Coordinator  
 Medical Sciences 601 (1975-1982) Cytology (shared)  
 Medical Sciences 642 (1974) Analysis of Development (shared)  
 Medical Sciences 823 (1982) Recombinant DNA Techniques course (shared)  
 Medical Sciences 613 (1983, 1985) Oncology (shared)

Nucleic Acids Graduate Course - Institute of Molecular & Cellular Biology - Singapore  
(1989,1991, 1994, 1996, 1998, 2000)

#### RESEARCH GRANTS:

Canadian Institute of Health Research Research – Structure, Function, & Properties of Uracil DNA glycosylase (1998-2001) \$246,744

National Science and Engineering Research Council (1993-1999) \$153,000.00

Canadian Institute of Health Research – Structure, Function, & Properties of Uracil DNA glycosylase (1993 – 1998) \$496,242

Medical Research Council of Canada – Polynucleotide Conformation (1972 – 1992) \$1,297,731

National Foundation March of Dimes (1977-1981) \$110,000.00

Province of Alberta Cancer Hospitals Board (1979-1983) \$120,000.00

Province of Alberta Cancer Hospitals Board - Equipment (1980-1981) \$231,315.00

Alberta Heritage Foundation for Medical Research - Equipment (1981-1990) \$415,000.00

NATO Collaborative Travel (1983-1986) \$15,000.00

U.S. Biochemical Corporation (1991-1992) \$17,500.00

Lifetechnologies (BRS) (1990-1992) \$20,000.00

#### GRADUATE STUDENTS:

Shirley D. Semaka	Ph.D.	1977
Bernd W. Kalisch	M.Sc.	1978
John D. Sheppard	M.Sc.	1978
George Chaconas	Ph.D.	1978
S. Wade Stoute	M.Sc.	1982
Freda D. Miller	Ph.D.	1985
Louise H. Naylor	Ph.D.	1987
Mark W. Germann	Ph.D.	1989
Priti Krishna	Ph.D.	1989
Fred Hagen	Ph.D.	1990
Harris Yee	M.Sc.	1991
Pallavi Devchand	Ph.D.	1994

#### POSTDOCTORAL FELLOWS:

9/25/2002

Ken V. Deugau	1975-1978
K.H. Schoewaelder	1983-1985
H. Elzanowska	1983-1986
U. Varshney	1986-1988
K. Jorgensen	1987-1988
D. Creasey	1988-1991
P. Svendsen	1994-1998
M. Brown	1998-present

## PUBLICATIONS

1. van de Sande, J.H. Studies in the oxidation of some olefins to allylic hydroperoxides. Ph.D. Thesis, The University of Alberta, pp. I-195 (1968).
2. Kopecky, K.R., van de Sande, J.H. and Mumford, C. Preparation and base-catalyzed reactions of some  $\alpha$ -halohydroperoxides. *Can. J. Chem.* 46:25-34 (1968).
3. van de Sande, J.H. and Kopecky, K.R. Convenient C-alkylation of some acyloins. *Can. J. Chem.* 48:163-164 (1969).
4. Agarwal, K.L., Buchi, H., Caruthers, M.H., Gupta, N.H., Kleppe, K., Kornana, H.G., Kumar, A., Ohtsuka, E., RajBhandary, J.L., van de Sande, J.H., Sgaramella, V., Wever, H. and Yamada, T. The total synthesis of the gene for an alanine transfer ribonucleic acid from yeast. *Nature* 227:27-34 (1970).
5. Kleppe, K., van de Sande, J.H. and Khorana, H.G. Polynucleotide ligase-catalyzed joining of deoxyribo-oligonucleotides on ribopolynucleotide templates and of ribo-oligonucleotides on deoxyribonucleotide templates. *Proc. Nat. Acad. Sci. USA* 67:68-72 (1970).
6. Sgaramella, V., van de Sande, J.H. and Khorana, H.G. Studies on polynucleotides, C. A novel joining reaction catalyzed by the T4 polynucleotide ligase. *Proc. Nat. Acad. Sci. USA* 67:1468-1475 (1970).
7. Khorana, H.G., Agarwal, K.L., Buchi, H., Caruthers, M.H., Gupta, M.K., Kleppe, K., Kumar, A., Ohtsuka, E., RajBhandary, U.L., van de Sande, J.H., Sgaramella, V., Terao, T., Weber, H. and Yamada, T. Total synthesis of the structural gene for an alanine transfer ribonucleic acid from yeast. *J. Mol. Biol.* 72:209-217 (1972).
8. Caruthers, M.H., van de Sande, J.H. and Khorana, H.G. Total synthesis of the structural gene for an alanine transfer ribonucleic acid from yeast. Synthesis of three decadeoxynucleotides corresponding to the nucleotide sequence 51-70. *J. Mol. Biol.* 72:375-405 (1972).
9. van de Sande, J.H., Caruthers, M.H., Sgaramella, V., Yamada, Y. and Khorana, H.G. Total synthesis of the structural gene for an alanine transfer ribonucleic acid from yeast. Enzymic joining of the chemically synthesized segments to form the DNA duplex corresponding to nucleotide sequence 46-77. *J. Mol. Biol.* 72:457 (1972).
10. Caruthers, M.H., Kleppe, K., van de Sande, J.H., Sgaramella, V., Agarwal, K.L., Buchi, H., Gupta, M.K., Kumar, A., Ohtsuka, E., RajBhandary, U.L., Terao, T., Wever, H., Yamada, T. and Khorana, H.G. Total synthesis of the structural gene for an alanine transfer ribonucleic acid from yeast. Enzymic joining to form the total DNA duplex. *J. Mol. Biol.* 72:475-492 (1972).
11. Besmer, P., Miller, R.C., Kumar, A., Minamoto, K., van de Sande, J.H., Siderova, M. and Khorana, H.G. Hybridization of polynucleotides with tyrosine transfer RNA sequences to the R-strand of o80PSU III. *J. Mol. Biol.* 72:502-522 (1972).

12. van de Sande, J.H., Loewen, P.C. and Khorana, H.G. A further study of ribonucleotide incorporation into deoxyribonucleotide chains by deoxyribonucleic acid polymerase I of *Escherichia coli*. *J. Biol. Chem.* 247:6140-6148 (1972).
13. Kopecky, K.R. and van de Sande, J.H. Deuterium isotope effects in the oxidation of 2,3-dimethyl-2-butene via the bromohydroperoxide, by singlet oxygen and by triphenyl phosphite ozonide. *Can. J. Chem.* 50:4034-4049 (1972).
14. Panet, A., van de Sande, J.H., Loewen, P.C., Raae, A.J., Lillehaug, J.L. and Kleppe, K. Physical characterization and simultaneous purification of polynucleotide kinase, polynucleotide ligase and DNA polymerase from *E. coli* infected with bacteriophage T4. *Biochemistry* 12:5045-5050 (1973).
15. van de Sande, J.H., Kleppe, K. and Khorana, H.G. Reversal of T4 bacteriophage induced polynucleotide kinase action. *Biochemistry* 12:5050-5055 (1973).
16. van de Sande, J.H. and Bilsker, M. Phosphorylation of N-protected deoxyoligonucleotides by T4 polynucleotide kinase. *Biochemistry* 12:5056-5062 (1973).
17. Powers, G.Y., Jones, R.L., Randall, G.A., Caruthers, M.H., van de Sande, J.H. and Khorana, H.G. Optimal strategies for the chemical and enzymatic synthesis of bihelical deoxyribonucleic acids. *J. Am. Chem. Soc.* 97:875-884 (1975).
18. Maniatis, T., Jeffrey, A. and van de Sande, J.H. Chain length determination of small double- and single-stranded DNA molecules by polyacrylamide gel electrophoresis. *Biochemistry* 14:3787-3794 (1975).
19. Imada, A., Hunt, J.W., van de Sande, J.H., Sinskey, A.J. and Tannenbaum, S.R. Purification and properties of an intracellular ribonuclease from *Candida Lipolytica*. *Biochim. Biophys. Acta* 395:490-500 (1975).
20. Lin, C.C., van de Sande, J.H., Smink, W.K. and Newton, D.R. Quinacrine fluorescence and Q-banding patterns of human chromosomes. *Can. J. Genet. Cytol.* 17:81-92 (1975).
21. Lin, C.C. and van de Sande, J.H. Differential fluorescent staining of human chromosomes by daunomycin and adriamycin - the D bands. *Science* 190:61-63 (1975).
22. Chaconas, G., van de Sande, J.H. and Church, R.B. Convenient methods to determine specific radioactivity of [ $\gamma$ - $^{32}$ P]ATP. *Anal. Biochem.* 69:312-316 (1975).
23. Chaconas, G., van de Sande, J.H. and Church, R.B. End group labelling of RNA and double stranded DNA by phosphate exchange catalyzed by bacteriophage T4 induced polynucleotide kinase. *Biochem. Biophys. Res. Comm.* 66:962-969 (1975).

24. Khorana, H.G., Agarwal, K.L., Besmer, P., Buchi, H., Caruthers, M.H., Cashion, P., Fridkin, M., Jay, F., Kleppe, K., Kleppe, R., Kumar, A., Loewen, P.C., Miller, R.C., Minamoto, K., Panet, A., RajBhandary, U.L., RamaMoorthy, B., Sekiya, T., Takeya, T. and van de Sande, J.H. Total synthesis of the structural gene for the precursor of a tyrosine suppressor tRNA from E. coli. I. General Introduction. *J. Biol. Chem.* 251:565-570 (1976).
25. van de Sande, J.H., Caruthers, M.H., Kumar, A. and Khorana, H.G. Total synthesis of the structural gene for the precursor of a tyrosine suppressor tRNA from E. coli. 2. Chemical synthesis of the deoxypolynucleotide segments corresponding to the nucleotide sequence 1-31. *J. Biol. Chem.* 251:571-586 (1976).
26. Minamoto, K., Caruthers, M.H., RamaMoorthy, B., van de Sande, J.H., Siderova, M. and Khorana, H.G. Total synthesis of the structural gene for the precursor of a tyrosine suppressor tRNA from E. coli. 3. Synthesis of deoxyribopolynucleotide segments corresponding to the nucleotide sequence 27-51. *J. Biol. Chem.* 251:587-598 (1976).
27. Agarwal, K.L., Caruthers, M.H., Fridkin, M., Kumar, A., van de Sande, J.H. and Khorana, H.G. Total synthesis of the structural gene for the precursor of a tyrosine suppressor tRNA from E. coli. 4. Synthesis of deoxyribopolynucleotide segments corresponding to the nucleotide sequence 47-58. *J. Biol. Chem.* 251: 599-608 (1976).
28. Agarwal, K.L., Caruthers, M.H., Buchi, H., van de Sande, J.H. and Khorana, H.G. Total synthesis of the structural gene for the precursor of a tyrosine suppressor tRNA from E. coli. 6. Synthesis of the deoxyribopolynucleotide segments corresponding to the nucleotide sequence 100-126. *J. Biol. Chem.* 251:624-641 (1976).
29. Kleppe, R., Sekiya, T., Loewen, P.C., Kleppe, K., Agarwal, K.L., Besmer, P., Buchi, H., Caruthers, M.H., Cahion, P., Fridkin, M., Jay, E., Kumar, A., Miller, R.C., Minamoto, K., Panet, A., RajBhandary, U.L., RamaMoorthy, B., Takeya, T., van de Sande, J.H. and Khorana, H.G. Total synthesis of the structural gene for the precursor of a tyrosine suppressor tRNA from E. coli. II. Enzymatic joining to form the total DNA duplex. *J. Biol. Chem.* 251:667-675 (1976).
30. van de Sande, J.H. and Kalisch, B.W. Polymerization of oligodeoxythymidylates and oligoriboadenylates catalyzed by T4 polynucleotide ligase and their use as analytical markers in polyacrylamide gel electrophoresis. *Anal. Biochem.* 75: 509-521 (1976).
31. van de Sande, J.H., Lin, C.C. and Jorgenson, K.F. The reverse banding patterns (R-bands) on chromosomes produced by a G-C specific DNA binding antibiotic: olivomycin. *Science* 195:400-403 (1976).
32. van de Sande, J.H., Lin, C.C., Johnston, F.P. and Jorgenson, K.F. Differential fluorescent labelling of chromosomes and DNA with base pair specific. DNA binding antibiotics in Molecular cytogenetics - ICN-UCLA Symposium on Molecular and Cellular Biology, Vol. VI, pp. 127-138 (1977).



33. Lin, C.C. and van de Sande, J.H. Mechanism of fluorescent banding in chromosomes: is base composition a primary determinant for the production of fluorescent bands? *Bull. Gen. Soc. Can.* 8:37-42 (1977).
34. van de Sande, J.H. and Lin, C.C. Differential fluorescent labelling of chromosomes and DNA with base pair specific DNA binding antibiotics. *Journal of Supramolecular Structure.* sup. 1, 105 (1977)
35. Johnston, F.P., van de Sande, J.H., Lin, C.C. and Jorgenson, K.F. Interaction of anthracyclines with DNA and chromosomes. *Chromosoma* 68:115-129 (1978).
36. Deugau, K.V. and van de Sande, J.H. T4 polynucleotide ligase catalyzed joining of short DNA duplexes at base paired ends. *Biochemistry* 17:723-729 (1978).
37. Jorgenson, K.F., Lin, C.C. and van de Sande, J.H. Interaction of chromomycin-like antibiotics with DNA and chromosomes. *Chromosoma* 68:287-302 (1978).
38. Deugau, K.V., Lin, C.C. and van de Sande, J.H. Bisintercalating DNA binding ligands as chromosome banding agents. *Exp. Cell Res.* 120:439-444 (1978).
39. Shepherd, J.C., Fritzler, M.J., Watson, J.I. and van de Sande, J.H. A fluorescence assay for anti-double stranded DNA antibodies in Systemic Lupus Erythematosus. *J. Rheumatology* 5:391-398 (1978).
40. van de Sande, J.H., Lin, C.C., and Deugau, D.V. Clearly Differentiated and Stable Chromosome Bands Produced by a Spermine Bis-acridine, a Bifunctional Intercalating Analogue of Quinarine. *Exp. Cell Res.* 120:439 (1979)
41. Kalisch, B.W. and van de Sande, J.H. The effect of antibiotics on T4 polynucleotide ligase catalyzed reactions. *Nuc. Acids Res.* 6:1881-1894 (1979).
42. Loucks, E., Chaconas, G., Blakesley, R.B., Wells, R.D. and van de Sande, J.H. The effects of antibiotics on the electrophoretic mobility of DNA restriction fragments. *Nuc. Acids Res.* 6:1869-1880 (1979).
43. Davies, P.L., van de Sande, J.H. and Dixon, G.H. Determination of base composition of nanogram quantities of polynucleotides. *Anal. Biochem.* 93:26-30 (1980).
44. Chaconas, G. and van de Sande, J.H. 5'-32P-labelling of RNA and DNA restriction fragments. *Meth. in Enzym.*, Vol. 65, pp. 75-85 (1980).
45. Lin, C.C., Jorgenson, K.F. and van de Sande, J.H. Specific fluorescent bands on chromosomes produced by acridine orange after prestaining with base specific non fluorescent DNA ligands. *Chromosoma* 79:271-286 (1980).

46. Gedamu, L., Chaconas, G., van de Sande, J.H. and Dixon, G.H. Studies on the heterogeneity of the 5'-ends of the protamine mRNA's from rainbow trout testis. *Bioscience Reports* 1:61-70 (1981).
47. Miller, F., Lin, C.C. and van de Sande, J.H. The interaction of DEAP fluoranthene with DNA and metaphase chromosomes. *J. Histochem. and Cytochem.* 29:969-978 (1981).
48. van de Sande, J.H. and Jovin, T. Z\* DNA, The left-handed helical form of polyd(G-C)<sub>2</sub> in MgCl<sub>2</sub>-ethanol is biologically active. *EMBO Journal* 1:115-120 (1982).
49. van de Sande, J.H., McIntosh, L.P. and Jovin, T.M. Mn<sup>++</sup> and Other Transition Metals at Low Concentration Induce the Right-to-Left Helical Transformation of Poly d(G-C), *EMBO* 1:777-783 (1982).
50. Miller, F.D., Rattner, J.B. and van de Sande, J.H. Nucleosome core assembly on B and Z forms of poly d(G-m5C). *Cold Spring Harb. Symp. Quant. Biol.* 47:571-575 (1982).
51. Jovin, T.M., van de Sande, J.H., Zarling, D.A., Arndt-Jovin, D.J., Eckstein, F., Fuldner, H.H., Greider, C., Grieger, I., Kalisch, B.W., McIntosh, L.P., and Robert-Nicoud, M., (1982). Generation of left-handed Z DNA in solution and visualization in polytene chromosomes by immunofluorescence. *Cold Spring Harb. Symp. Quant. Biol.* 47:143-154 (1982).
52. McIntosh, L.P., Greiger, I., Eckstein, F., Zarling, D.A., van de Sande, J.H. and Jovin, T.M. The left-handed helical conformation of poly d(A-m5C)d(G-T). *Nature* 304:83-86 (1983).
53. Jovin, T.M., McIntosh, L.P., Arndt-Jovin, D.J., Zarling, D.A., Robert-Nicoud, M., van de Sande, J.H., Jorgenson, K.F. and Eckstein, F. Left-handed DNA: From synthetic polymers to chromosomes. *J. Biomolec. Struct. Dyn.* 1:21-57 (1983).
54. Stockton, J.F., Miller, F.D., Jorgenson, K.F., Zarling, D.A., Morgan, A.R., Rattner, J.B. and van de Sande, J.H. Left-handed Z-DNA regions are present in negatively supercoiled PM2 DNA. *EMBO J.* 2:2123-2128 (1983).
55. Miller, F.D., Jorgenson, K.F., Winkfein, R.J., van de Sande, J.H., Zarling, D.A., Stockton, J.F. and Rattner, J.B. Natural Occurrence of Left-handed regions in PM2 DNA. *J. Biomolec. Struct. Dynam.* 1:611-620 (1983).
56. Jovin, T.M., McIntosh, L.P., Zarling, D.A., Arndt-Jovin, D.J., Robert-Nicoud, M., van de Sande, J.H. Probing for and with left-handed DNA: poly d(A-br5C).d(G-T), a member of a new family of Z-forming DNAs. in Pullman, B., (ed) *Nucleic Acids: The Vectors of Life*, D. Reidel, Dordrecht, Holland, pp. 89-99 (1983).
57. Hall, K., Cruz, P., Tinoco, I., Jovin, T.M. and van de Sande, J.H. Z-RNA: evidence for a left-handed RNA double helix. *Nature* 311:584-586 (1984).
58. Miller, F.D., Winkfein, R.J., Rattner, J.B. and van de Sande, J.H. Sequence analysis of a PM2 anti-Z IgG binding region. *Bioscience Reports* 4:885-895. (1984).

59. Miller, F.D., Rattner, J.B. and van de Sande, J.H. Assembly and characterization of nucleosome cores on B- versus Z-form DNA. *Biochemistry* 24:102-109 (1985).
60. Aiken, J., Miller, F.D., Hagen, F., McKenzie, D.I., Rattner, J.B., van de Sande, J.H. and Dixon, G.H. Characterization of a potential Z-DNA region adjacent to protamine genes in the Rainbow Trout. *Biochemistry* 24:6268-6276 (1985).
61. McIntosh, P.L., Jovin, T.M., Zielinski, J., Sprinzle, M., Kalisch, B.W. and van de Sande, J.H. Synthesis and characterization of poly d(G-Z5C) a 5' deoxyazacytidine containing polymer. *Biochemistry* 24: 4806-4814 (1985).
62. Germann, M.W., Schoenwaelder, K.H., van de Sande, J.H. Right- and left-handed helical (Z) conformations of the hairpin M(C-G)5T4(C-G)5 monomer and dimer. *Biochemistry* 24:4969-4973 (1985).
63. Kalisch, B.W., Krawetz, S.A., Schoenwaelder, K.H., van de Sande, J.H. Covalently linked sequencing primer linkers (splinkers) for sequence analysis of DNA restriction fragments. *Gene* 44:263-270 (1986).
64. Miller, F.D., Rattner, J.B. and van de Sande, J.H. Assembly of DNA onto the histone octamer facilitates the B- to Z-transition. *Bioscience Reports* 6: 467-476 (1986).
65. Naylor, L.H., Lilley, D.M.J. and van de Sande, J.H. Stress-induced cruciform formation in a cloned d(CATG)10 sequence. *EMBO J.* 5:2407-2413 (1986).
66. Krawetz, S.A., Kalish, B.W. and van de Sande, J.H. Covalently linked complementary oligodeoxynucleotides (splinkers) as tools for molecular biology. *Nucl. Acids Res.* 14:7131 (1986).
67. Naylor, L.H. and van de Sande, J.H. Improved sequence resolution of highly repetitive DNA fragments. *Nucl. Acids Res.* 14:5939 (1986).
68. van de Sande, J.H., Kalisch, B.W., Krawetz, S.A. and Schoenwaelder, K.H. Covalently linked complementary oligodeoxynucleotides as universal nucleic acid sequencing primer linkers. U.S. Patent 801-900 (1986).
69. van de Sande, J.H., Naylor, L.H., Germann, M.W. and Yee, H. Conformational polymorphism in torsionally stressed DNA in "Integration and Control of Metabolism Processes. ICSU and Cambridge Press (1987), p. 283-296.
70. Kubasek, W.L., Wang, Y., Thomas, G.A., Patupoff, T.W., Schoenwaelder, K.H., van de Sande, J.H. and Peticolas, W.L. Ramon Spectra of the model B-DNA oligomer d(CGCGAATTCGCG) and of the DNA in living salmon sperm show that they both have very similar B-type conformation. *Biochemistry* 25, 7440-7445 (1986).

71. Germann, M. and van de Sande, J.H. NACS-20 minor exchange chromatography of oligodeoxyribonucleotides. Prediction of elution behaviours from length and sequence. *Focus* 9, 5-7 (1987).
72. Varshney, U. and van de Sande, J.H. Use of  $^{32}\text{P}$ -dNTPs to enhance the radioactive signal of  $^{35}\text{S}$ -dNTPs in Sanger's DNA sequence analysis. *Biotechniques* 5, 410-411 (1987).
73. Germann, M.W., Pon R. and van de Sande, J.H. A general method for the purification of synthetic oligodeoxynucleotides containing strong secondary structure by reversed phase. High performance liquid chromatography on PRP-1 resins. *Anal. Biochem.* 165, 399-405 (1987).
74. Naylor, L.H., Yee, H. and van de Sande, J.H. Length-dependent cruciform extension in  $\text{d}(\text{GATC})_n$  sequences. *J. Biomol. Struct. Dynamics* 5, 895-912 (1988).
75. Jorgenson, K.F., Varshney, U. and van de Sande, J.H. Interaction of Hoechst 33258 with repeating synthetic DNA polymers and natural DNA. *J. Biomol. Struct. Dynamics*, 5, 1005-1023 (1988).
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